Assessment processes and digital technologies

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Introduction

As has been explored throughout this book, digital technologies are transforming approaches to musical performance and composition. As digital tools are developed, applied, used and abused by practitioners, it can be hard for those of us working in education to keep track of the latest innovations. At any one given moment, a particular instrument, technology, piece of software or iPad app might be the specific flavour of the month.

There are at least two dangers here. Firstly, it is easy to fall into the trap of presuming that this is a unique situation, something that previous generations of musicians and educators did not have to face. But, of course, this is a falsehood. Change is constant factor in our musical history, performance and compositional practices, just as it is in educational theory and practice. The pace of change might vary throughout history, but every age has its fair share of technological change to contend with. Secondly, there are strong commercial pressures from manufacturers, and broader societal pressures from consumers (particularly our students), to keep up to date with what the latest technological innovations are and to adopt them within our classrooms. Uncritical adoption and use of technologies is a constant threat to a high quality music education. We will explore this thought a little further below when we consider the importance of evaluating our choice of music technology critically.

Following Bertrand Russell's advice that 'the demand for certainty is one which is natural to man, but is nevertheless an intellectual vice' (Russell 1946, p.26), we would argue that trying to predict future patterns of engagement in how musicians develop their use of technology, or how educators might seek to devise approaches for the assessment the musical outputs that result, is a pretty futile task. Maybe you think that is a strange assertion to make at the beginning of a chapter on assessment and music technology? Perhaps, but we need to remember that best way to understand the interrelated issues of assessment and digital technology, and thereby prepare for an uncertain future, is to investigate, appreciate and understand practices in this area today. Like Furedi, we would argue that:

> In the worldview of the educational establishment, change has acquired a sacred and divine-like character that determines what is taught and what is learned. It creates new 'requirements' and 'introduces' new ideas about learning. … Typically change is presented in a dramatic and mechanistic manner that exaggerates the novelty of the present moment. Educationalists frequently adopt the rhetoric of breaks and ruptures and maintain that nothing is as it was and that the present has been decoupled from the past. (Furedi 2009, p.23)

In this chapter we will attempt to provide a narrative about these issues as they are exemplified today. Following a general exploration of four key questions about assessment and music education, we will draw upon a detailed investigation of digital technologies within a particular context to provide illumination and insight into issues relating to the theory and practice of assessment. As with the children and young adults that we teach, the process of familiarising ourselves with the world as it is today gives us the best opportunity (and in Arendt's words the 'existential security') to have a chance of attempting something new (Levinson 1997, p.7).

Some Introductory Questions about Assessment

As we have seen throughout this book, digital technologies transform approaches to musical activities. The notion of what constitutes a musical performance, composition or improvisation, who is doing it, where they might be, how they interact with an audience that may or may not be physically present, the musical skills needed to perform, and the musical understanding to respond expressively to others, are all highly contestable and problematised in different ways by digital technologies.

Within educational settings, the requirements to assess students' work both formally, for external examination, and informally have, perhaps, never been stronger. Yet the systems of assessment in teaching and learning contexts seem peculiarly non-musical, uncreative and unresponsive to the sweeping array of new musical possibilities that digital technologies have facilitated. In what follows we will explore how assessment processes can, or perhaps should, be developed to provide a more appropriate and critical account of students' musical work with digital technologies. In particular, through the analysis of the work on one contemporary musician and a metaphorical application of key ideas, we will examine how digital technologies themselves can provide a useful framework of ideas for a meaningful and authentic assessment process; one that embraces and values the student themselves, and their work, rather than being constructed and conducted as an external processes of testing.

The assessment of a student's work in music, or whatever type, needs to begin by asking a number of basic but very important questions:

- *What* is being assessed?
- *How* is it being assessed?
- *Why* is it being assessed?
- *Who* is the assessment for? And *what will happen* to the assessment data produced?

1. *What* is being assessed?

At its simplest, the question of *what* is being assessed is asking the teacher to think about from the entirety of musical endeavour available, what specifically is being looked at in this assessment? So, for example, in assessment of composing, what is 'in', and what is 'out' of the assessment? Is it an assessment of a particular skill within the process of composing, e.g. the ability to recognise and explore the potential of a musical fragment in a developmental way? Or is it assessment of the product that results from the composition, e.g. does the composition as a whole have a meaningful musical structure? If the assessment is focusing on the processes involved in musical composition, how is this undertaken, recognised and communicated to the student?

2. *How* is it being assessed?

Addressing the issue of what is to be assessed is only part of the task, however. This is because the next question, *how* is it being assessed, also has significant ramifications. At its most straightforward, this question could be about the type of assessment process being adopted. The assessment types that are most frequently encountered are:

- Formative: An assessment that happens as work is being undertaken, and is purposed with improving the work done by the student. Often undertaken in dialogic form;
- Summative: An assessment at the end of a unit, scheme, term (etc.) which is designed to *summarise* student attainment into a mark, grade, or level;
- Ipsative: An assessment the student makes against their own prior performance, so that they are measuring their personal progression against their own previous work.

But there is more to it than this. If the assessment being made is a formative one, then the teacher will want to provide feedback to the student concerning how well they are doing. If it is a teacher-devised summative assessment that is being undertaken (i.e. not an externally organised summative assessment), then the immediate question becomes how will this be done? As we have seen, summative assessment requires a summarising mark. The teacher will need to construct a mark scheme, rating scale, or rubric of some sort that delineates the qualitative aspects of attainment in some sort of quantitative order (e.g. marks out of 10, percentages, or whatever).

When music technologies are involved, this is not as simple as it might seem. One of the aspects of assessment of musical process using digital technologies may be, where possible, to distinguish between the human contribution and that of the technology involved. Specific questions may need to be asked about the role of the technology. In essence this is no different from thinking about more traditional aspects of musical performance on, say, a trombone compared with a piano. There is no point in creating a mark scheme for a performance that rates the musician's ability to play beautifully

articulated harmonic progressions, as the trombone cannot do this, whereas the piano can. As we will consider below, the limitations or affordances provided by the digital technologies being used does need to be taken into account, although in our view it is the human involvement that should be of prime concern within the processes of assessment. What this means in practice is that the teacher needs to have a detailed understanding of what it is that is being done by the student, as well as what the music technology has afforded. This means that evaluating the potential of a piece of music technology is an important educational activity what works closely alongside that of assessing a student's work. We will consider this further below.

3. *Why* is it being assessed?

How one might assess the human contribution within any technology-mediated musical activity takes us to the next question to be considered - *why* is the assessment taking place? This question normally generates one of two responses:

- To help the student improve the work which they are doing;
- To provide a grade or mark for work which has been done.

In the case of the former, these are often formative assessments, whereas in the latter they will always be summative assessments. However, we also have the case of the formative use of summative assessment. This is where a grade is provided, but the object of providing that grade is to help the student improve their work. So knowing that their work would score, say a mark of 65% means that the student has room for improvement in what they do. This becomes formative when the tutor helps the student to realise what it is exactly that they need to do in order to improve.

4. *Who* is the assessment for? And w*hat will happen* to the assessment data produced?

The question 'why' as we have just addressed it clearly has commonality with the final introductory questions, '*who* is the assessment for', and '*what will happen* to the assessment data'. Perhaps the audience for the assessment is varied, but the two most important constituents are the student and the teacher; in many cases these are also the people who will be end-users of the assessment data. But in today's performativity-driven education system, there are also occasions when assessment data produced is *not* for the teacher and student, it is for systemic purposes of monitoring student progress and ensuring accountability. This sort of assessment data needs very careful handling, as it may not be in the best interests of the teacher or the student to have raw, decontextualised assessment data fed into the system; for example if the student has done much worse than expected on a summative assessment due to mitigating factors, for example. Using this data as predictor for final outcomes may well not be appropriate.

These general questions frame the work of all music teachers. For a more detailed understanding of how these issues might play themselves out with the context of a technologically-rich learning environment, we are going to turn our attention to one study of musical improvisation within such a context – electroacoustic music. Our hope is that by presenting this context to you, we can, through a playful application of metaphor, begin to expand on what an alternative approach to assessment with digital technology might contain.

Improvising Machines

Bowers' *Improvising Machines* (Bowers 2003) explores the improvisation of electro-acoustic music from various standpoints, including its musicological, aesthetic, practical and technical-design dimensions. Within it, detailed ethnographic descriptions of the author's own musical performances over a period of a number of years at different concerts across Europe are described, and the various pieces of hardware and software through which these were facilitated are analysed. For anyone with an interest in electro-acoustic music, musical improvisation, the human-design interface and the wider adoption of digital technologies it is a fascinating and worthwhile read. We would highly recommend it.

Following a general opening chapter, Bowers presents an argument that electroacoustic music is an indigenous 'machine music'. He explores his own experience as an improviser in this idiom, giving special attention to observable variations in the forms of technical interactivity, social interaction and musical material which existed across the various musical performances that he gave with fellow performers. It is towards the end of this chapter (ibid, pp.42-51) that he identifies a range of analytic issues drawn from his work as a musical improviser within this idiom of machine music. These four issues inform his writing in later chapters (notably the exploration and development of a technical design aesthetic in Chapter 3), but are of particular interest for us here in relation to our discussion of assessment and digital technologies.

1. Contingent Practical Configurations

> The music has arisen in relation to these contingencies in such a way that, from an ethnographic point of view, it should not be analytically separated from them. (ibid, p.43)

Bowers defines 'contingent practical configurations' as the technologies used, musical materials and forms explored, performance practices employed, and the specific setting and occasion of, as well as the understanding generated from, musical improvisation.

Bower's argument is that the contingencies that occur within his various performance events are not to be seen as problematic obstructions to an idealised improvisational performance. Rather, they are 'topicalised' within the

performance itself. They are integral to it and shape the resulting musical statements, interactions and expressions. Improvised musical conduct of the sort Bowers described is a space in which these contingencies are worked through in real time and in public. The specific contingency of technology-rich musical improvisational conduct is embodied in the relationship between human beings and their machines. You cannot have one without the other. Specifically, 'it is in our abilities to work with and display a manifold of human-machine relationships that our accountability of performance should reside' (ibid, p.44).

2. Variable Sociality

> The sociality of musical production is an important feature of improvised electro-acoustic music. Publicly displaying the different ways in which performers can position themselves with respect to each other and the different ways in which technologies can be deployed to enforce, negate, mesh with, disrupt, or otherwise relate to the local socialities of performance could [again] become the whole point of doing it. (ibid, p.45)

As with any musical practice, within 'machine music' the social interactional relationships that Bowers and his fellow musicians enjoyed varied over time. There was a deliberate playfulness here. Different alternatives were experimented with, variably and often interchangeably, within the course of a specific musical performance. One particular set of social norms might be disrupted at a particular point, perhaps due to technical issues (cables are not long enough or the monitoring is lop-sided) or other factors (the audience begins to leave or the music is too loud and complaints are received from others in the locality). Variable sociality is the different social, interactional relations that are worked out through musical performance.

But as the above quote puts it, these social dimensions of musical production are highly important. Within an understanding of improvisational conduct with technology as part of a musical performance, they need to be understood and explored as an integral part of the aesthetic, not as a separate issue.

3. Variable Engagement and Interactivity

> Just as performers can variably relate to each other, they can variably engage with the technologies and instruments before them. (ibid, p.45)

Bower's concept of variable engagement and interactivity facilitates a consideration of the different and varying relations that performers have with respect to their instruments and technologies. In particular, he identifies a number of different patterns of engagement both for the musical performer and for the listener. These have important implications for the ways in which teachers listen to and make judgements about student's work that we will explore below.

His twelve-hour musical performance in Ipswich (at which audience members were given a free can of baked beans in return for their attendance!) utilised a range of mechanised musical production technologies that, at particular points, would automatically set new parameters for musical statements or even draw on new source materials from the performer's laptop computers. The pattern of engagement from the performer's point of view was one of initiation, delegation, supervision and intervention. This process meant that it was not always necessary for one, or both, of the musical performers to be physically present within the space for the whole of the twelve hours.

Alternatively, other forms of musical production within these performance events utilised more conventional instruments that required some kind of human incitement to action. The pattern of engagement here would be one of physical excitement/incitement and manipulation.

Bower's suggests that these forms and patterns of engagement can be further complexified. Firstly, different forms of engagement have different phenomenologies associated with them. How one listens, hears, responds intellectually or physically act all effect and affect one's engagement and interaction with sound and its means of production. Furthermore, Bowers raises the issue of *intelligibility* which does, for us, seem to be closely linked to the transparency of gesture and communication (both between performers and with an audience) within electroacoustic musical performances. His account of one incidence at a concert in Siena (a duet with 'SOH') is informative:

> My account of how we enacted the planned waves of intensity at Siena should reveal some close co-ordinations between players of bodily gesture with respect to touchpads, keyboards and knobs. I ensured that critical knob adjustments were made visible to SOH by carrying through the local turning at the front panel into a perspicuous whole body movement. In the context of the unfolding music and how it enacted the score, this gestural sequence was legible to SOH as accomplishing the transition into the final section. I assume that, just as my activity was visible to SOH, it would have been to the audience. It would accompany a notable transition in intensity and could be interpreted as bound up with its production. The audience would not have the same resources as SOH, however, for drawing the precise implication that he did (here we are in the score) but my movements would not be meaningless thrashings. (ibid, p.47)

Of course, there is nothing particularly unique to electroacoustic musical performance about these points. Although, as many have commented, there is always a frustration associated with performance practices within which 'performers' deliberately mask their identity and bodily gestures. For Buxton, musical performance is a compromise between the presentation of the scored and the improvised where physical, emotional, gestural, active and reactive components all have a part to play. He draws up a continuum within which the visibility or invisibility of musical cause and effect outwork:

> I must confess, that I have the same emotional and intellectual response to watching someone huddle over a laptop as I did 20 – 30 years ago when they were huddled over a Revox tape recorder. The more invisible the gesture and the more tenuous my perception of the correlation between cause and effect, the less relevant it is to me that a performance is 'live'. (Buxton 2005, p.4)

4. Musical Materials

> To construct workable and intelligible performance environments, I have made various distinctions between these musical materials in terms of their real-world sources, the media by which they are conveyed, the manipulability of those media, the kinds of gestures and devices which are used to realise those manipulations. From time to time, all of those features are seen to be bound up with identifiable forms of social organisation between co-performers, and those forms of interaction have musical-formal aspects to boot. I have tried to reveal these interconnections through ethnographic description of the performance situation. (ibid, p.48)

Bowers' sophisticated organisation of musical materials draws on a range of existing methodological strictures for electroacoustic composition. Whilst he is at pains to emphasise the differences here, his account is illuminating when placed alongside his analysis of Schaeffer's acousmatic composition (and allied practices), Emmerson's distinction between aural and mimetic discourse, and Smalley's spectro-morphological categorisations. These all provide a frame for dialogue and discussion about the sounds that Bowers and his co-performers produced during their improvisations and, importantly for us, about how they reflected on and justified the musical 'product' that resulted at the various concerts.

Central to this discussion (ibid, pp.48-50) is the question of how an overall musical structure of 'syntax' can emerge from an improvised performance practice. Drawing directly on Emmerson's work on musical syntax (Emmerson 1986), Bowers writes that:

> Improvised forms are naturally immanent, ad hoc-ed moment-by-moment on the basis of what has gone before and projecting opportunities for what might come following. In the language I hinted at above, multiple threads of significance may link up several of the elements in play. There may still be singularities and other 'unattached' offerings. The threads may be thin or may be densely interwoven (steady with the metaphor now!). We may have a sense of 'a piece' or a collection of 'moments' or some point in between. These are some of the immanent forms, of abstracted syntax, one can hear generated by electro-acoustic improvisors. (ibid, p.50)

It is intriguing that much of this discussion has taken place after the event. In the improvisational moment, the opportunities for this critical and reflective thought are fleeting but, nonetheless, we would agree with Bowers that they do inform, perhaps intuitively, the actions that musical improvisers make. For

educators, bringing these ‘moment-by-moment’ significances to light through a well-designed assessment process is vital.

Developing Approaches to Assessment with Digital Technologies

In *Improvising Machines* Bowers presents an illuminating narrative about the processes and products of his improvisational conduct within the context of electroacoustic music. It contains a blend of musicological features, technical considerations and reflective comments, underpinned throughout by a rigorous approach to an ethnographic and critical analysis. What can Bowers’ work teach us about assessment?

1. Assessment takes place within a rich context of contingent practical elements.

The contingent practical configurations that Bowers describe are fundamental and integral to his process of improvising with machines. Bowers is able to list them – the technology itself, the musical materials that are generated, the musical forms that emerge, the performance practices that are adopted, the settings within which the improvisations are staged, the occasions of the concerts, and the emergent understandings of the various participants, include the audience, who witness the events.

It is only through a strong commitment to exploring the intricate relationships that develop (both during the process of musical improvisation and retrospectively, through reflective thinking) that a true (or at least a defensible) understanding of what has occurred can be established.

This approach is a challenge to us as teachers. It raises a number of pertinent questions. To what extent are we able to map out the contingent practical elements that are at work within a particular process of assessment? The type and location of these elements might be diverse, extending from the classroom where learning might be initiated, to the student’s home environment where it continued and developed, from conversations with their friends at school to conversations they have online with others about their work; they may include formal elements such as the unit of work within which the assessment is based, to informal elements such as the album of music that the student listened to yesterday. They will undoubtedly include the quality of relationship that the student has both with you, their teacher, and their peers, their instrumental teacher or other admired role models.

Unpicking all of these elements is important. In order to meaningfully assess a student’s work, you have to know that student well and contextualise their work within that framework. This means developing a rich understanding of the broad context within which that student’s work has been produced. Only then can you begin to understand why that particular student has made the particular musical choices that they have made. The mechanisms by which

this broader context can be established are varied. For us, conversation is at the heart of the assessment process here. Skilful questioning, often done in an informal way and at opportune times, can be the most useful assessment skill that a teacher needs to develop to really understand the broader context of influences that has informed a specific piece of work.

2. Assessment takes place within a rich social context.

Alongside the practical contingent elements that Bowers reminds us about, the exploration of musical improvisation with technology as a metaphor for assessment reminds us that it takes place in a rich social context too. Here, Bowers emphasises the strong interactional relationships that take place between musical performers, and between musical performers and their audience.

Technologies play an integral role here. They can help enforce the social order, or they can negate it; they can facilitate a meshing of ideas and responses, or they helpfully or unhelpfully disrupt them. This ‘interactional’ dimension that technology imposes on our relationships is embraced in a playful way by Bowers, leading to his constant experimentation throughout the various concerts and the establishment of his term of ‘variable sociality’.

Within any assessment regime or process there are obvious social norms at play. Work should be handed in at a particular time and in a particular format, teachers rightly have expectations that need to be communicated, students have expectations about what the teacher requires (which might be very different from what the teacher said!), the notion of individual student ownership is common as is the strong sense of value that students place on their own work, peer assessment should be done in an even-handed way, and so on. These social norms are a standard part of any educational environment.

Technology can complicate these social norms. Suddenly, perhaps, it is not obvious who owns a particular musical product. Did the student do that? Or did a machine do it? Does it matter? If student A did that (played a chord on their guitar, for example) and student B did that (manipulated the sound of that chord through a processing unit to great effect), who should get the credit? Or to take another example, within a studio-based teaching session numerous students might be making suggestions, commenting, crafting and helping to shape a particular mix. Separating out ‘credit’ for their work in these circumstances is not easy. But Bowers goes on to give us some interesting potential answers.

3. Thorough assessment depends on understanding a broader process of engagement and interactivity.

For Bowers, musical improvisation with machines is a complex business. It builds on numerous contingent practical elements and configurations and is mediated through a process of variable sociality. It demands that a participant is able to diagnose and work within a range of approaches for musical engagement and interactivity.

Different technologies demand different approaches. Bowers maps these out. There is little point in trying to force one way of working with one technology directly into another context. Each context, each technology, each machine is very different. For Bowers, one of the key skills that a musical improviser needs is flexibility, a willingness to embrace and respond, intuitively and fluently, to the emerging streams of sound that these instruments produce.

As with improvisation, so with assessment in its most articulate form. Skilful teachers recognise that assessment is a broad process of engagement and interactivity. The exact models for such engagement and interactivity are hard to predict in advance. But there are some good starting points.

Teachers initiate something. They start students off in a direction. Is that always the right direction? It depends on your viewpoint. Students may subvert their teacher's expectations. Are teachers happy about that? Is the ability to subvert and play with one's expectations an important musical skill? Perhaps. For teachers, maybe it is important not to be too dogmatic early on. To do so could lead to conformity and dull responses.

Following an initiation, there is a delegation. Teachers have to transfer ownership and power to their students. Students need space and autonomy. They need time to explore, to experiment, to work with their machines and try to obtain outcomes that are of value to them. Delegation might involve handing over significant control to a technology, for a time, to see what emerges. The key here is to consider the human endeavour in equal measure to the technological input. It is the student who will add and express value to a technological utterance.

In terms of an assessment process here, it is important for teachers to spend time observing this crucial 'delegation' stage. Observe students working naturally. Do not jump in with your comments too soon. Listen to their conversations. Note their actions. In particular, watch out for any disruptive moments where they struggle, for whatever reason, to make sense of something. Therein lies an opportunity for you to assist their progress and development through skilful teaching.

Also watch out for complacency and disengagement, not just in the task itself, whatever that may be, but also in the critical thought that needs to be maintained when working with music technology. Encourage your students not to succumb to the prevailing narratives that technologies impose on their work. Teach them to be critical, to abuse technology as well as use it, and to always keep their creative options open.

If students are not to continue their work indefinitely, there will come a time when the teacher has to exercise a legitimate supervisory role. Perhaps the time is up for that piece of work, a new direction needs to be taken, or the deadline for submission is near. With supervision comes intervention. Intervention might mean a day of reckoning. However, it could just mean a moment of reckoning or accountability, a pointing in a new direction – a tack as it were – before the students are off again.

Initiation, delegation, supervision and intervention; here is just one potential approach to assessment that is in tune with the ways of working with digital technologies outlined in *Improvising Machines.*

But there is another very important issue here. Interactivity is equated to intelligibility. What does this mean for teachers wishing to develop a sensitive and informative approach to their students' work with digital technologies? For us, it means a commitment to really listen hard to their students' work. We do not mean a token listening, but a real effort to hear what they are trying to say, to commit to grappling with it until you, as their teacher, really understand it and where it has come from. Out of this, you can then respond, sensitively, and act, responsibly, in an engaging way. Assessment here is not a tool to bash our students with. In this sense, it is about nurturing and encouraging their musical utterances, and whatever stage of development they are, and being completely devoted to understanding them. It is about teachers truly valuing their students' musical voices and finding contexts within which they can be expressed with confidence and the certainty that they will receive a positive and fair hearing.

Finally, it will be very important for teachers to adopt a role as an advocate for their students' work with music technology. As we discussed above, the questions of what happens to the assessment data that this process produces is a vital one. If summative judgements are to be made by others about a student's work, then it is vital that the teacher has done a detailed job in really understanding their student's work, and representing the context within which it has been produced, in any submission. An advocate is a defender, and teachers will need to defend their judgements against the blunt, and often deconstructive, mechanisms of external validation through set criteria.

<u>4. Assessment must build upon its subject's roots.</u>

Finally, in this metaphorical application of lessons drawn from Bowers' *Improvising Machines*, we are reminded that music itself, as a subject, contains the roots of an assessment practice within it.

For Bowers, the process of improvisation with machines was a journey of discovery. This was a long term commitment to working with the raw materials of music, to develop an appropriate performance practice alongside the machines that he had chosen (as well as his musical partners), and to

uncover, in his words, a *syntax* of musical expression with which he was able to converse through in various ways.

Music is not a universal language, but within the specifics of a particular genre or style and the work of performers, composers and listeners within it, one can begin to recognise gestures, utterances, shapes, sentences if you like, that carry meaning. These elements get exhibited and approved in all kinds of ways. It might be a glance, a nod of the head, the tapping of a foot, a smile across the studio, an affirmational vocalisation or a positive comment, or something else entirely. Whatever these 'in the moment' and 'of the moment' validations of a musician's work are, and whenever they occur, they are what really count.

Assessment, as a practice, needs to be more musical. First and foremost, it needs to be developed through a musical language (and we do not just mean sounds) that is authentic to the context within which it occurs. By language we mean the spoken, written, gestured and musical iterations and interactions that occur between individuals in a musical group. For teachers, the key is finding a way to be part of these musical conversations in a way that does not interrupt or stifle students' creativity. Like researchers, teachers will need to recognise that they will have an impact on any situation that they are part of, but this should not stop them putting themselves in those positions. Teachers will need to analyse and reflect carefully on the impact that their presence has though. This will need to be accounted for in the assessment process and any judgements that arise from it.

Put simply, skilful teachers take time to stop and listen. They resist the urge to jump in, offer opinions or interrupt the flow of a musical exchange. If things are not working, for whatever reason, these teachers use skilful questions or prompts to help their students find their own way through, solve the technological difficulty they are facing, or encourage them to use their instruments in a new way to stimulate a different creative direction.

A Quick Note About Evaluating Technologies

> Evaluation is always based on data. Avoid evaluations which start with a judgement about whether a project was good or bad, whether it worked or not. In good evaluations, judgements grow out of that data. … Evaluation usually settles for something that is persuasive. (Kushner 1992 p.3)

As with projects, the same can be said about 'products'. The prospect of evaluating a specific music technology and its use may seem daunting, but there are many benefits in considering which technologies have been successful, what might need to be developed further, what can be re-purposed perhaps, and what should not be used again. Some of this work might relate directly to the process of assessment, e.g. the teacher may want to explore whether their students have attained in a fashion that is at least

similar to what they might done had a particular piece of technology not been used.

Kushner's reference to the important of data in making evaluative judgements prompts an obvious question for us: what types of data should the teacher be using to make judgements about the effectiveness of the music technologies that are being used in their classrooms? Kushner would argue for the benefits of naturalistic evaluation. Principally, this generates data drawn from observation of educational exchanges and discussion with the participants within these settings. Given that most teachers will be acting in a dual role, i.e. of teacher and evaluator, we would argue for the pre-eminence of the teacher voice alongside that of the student voice.

So, here are some key questions that teachers might like to consider as they begin to evaluate the specific music technologies that they are using in their teaching:

1. What values underpin this particular piece of music technology? How do they relate to my own musical values and those of my students?
2. How have my students learnt with this piece of technology? In what ways have they learnt differently compared to a more traditional approach? What have I learnt by the whole experience?
3. Who have been the winners and losers with this piece of music technology?
4. How would I describe my teaching approach with this piece of music technology? Has it been authoritarian or democratic, formal or informal? What aspects, if any, of my pedagogy have changed or developed from my traditional pedagogical approach?
5. Were my original aims, objectives and activities for this piece of music technology appropriate? How did they change and develop time?
6. Whose knowledge really counts when using this piece of music technology? How did I relate its use to the broader subject knowledge base that I am trying to infuse throughout my teaching?

Conclusion

Assessment contains within it the notion of evaluation, of endeavouring to determine the qualitative aspects of a piece of student's work and make judgements about them. Saying how good something is in the arts can be difficult, and clearly simply liking something is not enough. As teachers, and as students, we need to work hard at really understanding our musical engagements and products.

Early, in our consideration of the four simple questions about assessment, we discussed the use of assessment criteria. These can certainly help in focussing our own attention on a particular aspect of a student's work. They can also help students prioritise their activities in a particular creative task. But what we also need to do in order to use assessment in a more holistic way is

to endeavour to ascertain students' understandings of what they want to do, and how this fits with what they are required to do. As one of the early writers on formative assessment observed:

> The student comes to hold a concept of quality roughly similar to that held by the teacher (Sadler, 1989 p.121)

Clearly, this is a double-edged sward (depending on the concept of quality that a teacher has!), so, as we have emphasised throughout our chapter, in order to do this the teacher needs to enter into a dialogue with the students concerned, and find out what they are doing, and why. This will mean that the students' own views on quality need to be taken into consideration, and as Hickman observes:

> If criteria are considered to be necessary … the community decides on criteria for assessment, but we need to determine the size of the community; I would advocate that the learner's own criteria be used, which means that the community is a minimum of two people. (Hickman, 2007 p.84)

This taking into account of learner views is not simply about privileging the learner voice, but about ascertaining what they are doing, and, importantly, *why*. As Hickman goes on to observe:

> It is concerned with the evaluation of personal achievement rather than an individual's relationship to local or national norms … students' self-assessment provides teachers with insights into students' understanding of their own progress … It is concerned with individuals' growth and development; because developmental or ipsative assessment is intrinsically learner-centred, it is made by negotiation between teacher and taught and often takes the form of students self-assessment. (ibid, p.79)

In considering any creative work, whether using music technology or not, it is useful to think about what the student concerned thinks about their own attainment, and how this relates to what they were hoping to achieve in the first instance. In the case of music technology, the additionality offered by the technology also needs to be considered within the context of the specific work of the student.

Rich accounts of musical performance, improvisation and composition can provide illuminating insights into the reflective, critical and analytical thinking that inform them. These insights can be harnessed and adopted within a teacher's pedagogy and result in a more skilful model of music teaching. Our hope is that our analysis of Bowers' work, and our more general exposition of educational assessment, will help readers move their work forwards in this important area.

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